

WHAT IS CLAIMED IS:

1. A component-placing apparatus for driving a suction nozzle in the rotational (θ) and vertical (Z) directions for applying suction to a component, comprising:

a rotary actuator;

a linear actuator comprising a stator connected to a stator of the rotary actuator such that these stators are immovable relative to each other;

a spline shaft connected to a rotating shaft of the rotary actuator;

a nozzle connecting shaft connected to the spline shaft for being allowed to move only rectilinearly in the longitudinal direction of the spline shaft relative to the spline shaft and having the suction nozzle disposed at the bottom thereof;

a hollow holder encircling the nozzle connecting shaft with rotary bearings being interposed therebetween which allow the nozzle connecting shaft to rotate with respect to the spline shaft and connected for being driven by a mover of the linear actuator; and

a linear guide for guiding the hollow holder relative to the stators of the actuators so as to be rectilinearly movable parallel to the spline shaft.

2. The component-placing apparatus according to Claim 1, wherein the stators of the rotary actuator and the linear actuator are fixed to a moving head of a drive mechanism which is operable for driving the moving head in the X- and Y- directions.

3. The component-placing apparatus according to Claim 1, wherein the mover and the stator of the linear actuator have a return spring disposed therebetween for urging the mover upwards, the return spring having a spring force which is slightly greater than the sum of the weight load of a moving part of the apparatus including the

mover, the suction nozzle, and the nozzle connecting shaft, and a sliding frictional force generated between the linear guide and the spline shaft.

4. The component-placing apparatus according to Claim 1, wherein the hollow holder and the nozzle connecting shaft have a sealed chamber formed in a space therebetween;

the nozzle connecting shaft has an air passage formed therein for transmitting a pressure medium in the chamber to the suction nozzle;

an air port in communication with the chamber is formed in the outer surface of the hollow holder, and

the air port is connected to a vacuum suction apparatus.

5. A component-placing apparatus for driving a suction nozzle in the rotational (θ) and vertical (Z) directions for applying suction to a component, comprising:

a rotary actuator having a rotating shaft;

a linear actuator comprising a stator connected to a stator of the rotary actuator such that these stators are immovable relative to each other;

a nozzle connecting shaft having the suction nozzle disposed at the bottom thereof;

the nozzle connecting shaft being connected to the rotating shaft by a coupling which allows the nozzle connecting shaft to move only rectilinearly in the longitudinal direction of the rotating shaft, relative to the rotating shaft;

a hollow holder encircling the nozzle connecting shaft with rotary bearings being interposed therebetween which allow the nozzle connecting shaft to rotate and connected for being driven by a mover of the linear actuator; and

a linear guide for guiding the hollow holder relative to the stators of the actuators so as to be rectilinearly movable parallel to the rotating shaft.

6. The component-placing apparatus according to Claim 5, wherein the stators of the rotary actuator and the linear actuator are fixed to a moving head of a drive mechanism which is operable for driving the moving head in the X- and Y- directions.

7. The component-placing apparatus according to Claim 5, wherein the mover and the stator of the linear actuator have a return spring disposed therebetween for urging the mover upwards, the return spring having a spring force which is slightly greater than the sum of the weight load of a moving part of the apparatus including the mover, the suction nozzle, and the nozzle connecting shaft, and a sliding frictional force generated at the linear guide and at said coupling.

8. The component-placing apparatus according to Claim 5, wherein the hollow holder and the nozzle connecting shaft have a sealed chamber formed in a space therebetween;

the nozzle connecting shaft has an air passage formed therein for transmitting a pressure medium in the chamber to the suction nozzle;

an air port in communication with the chamber is formed in the outer surface of the hollow holder, and

the air port is connected to a vacuum suction apparatus.